

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

ORIGINAL
FILE

In the Matter of:

MOTOROLA SATELLITE
COMMUNICATIONS, INC.

CONSTELLATION COMMUNICATIONS, INC.

TRW, INC.

ELLIPSAT CORPORATION

LORAL QUALCOMM SATELLITE
SERVICES, INC.

CELSAT, INC.

Requests for Pioneer's Preferences
with Regard to Proposals to
Establish Low-Earth Orbit
Satellite Systems in the 1610-
1626.5 MHz and 2483.5-2500 MHz
Bands.

ET Docket No. 92-28

PP-32

PP-29

PP-33

PP-30

PP-31

PP-28

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Federal Communications Commission
Office of the Secretary

To: Office of Engineering and Technology

COMMENTS

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SUMMARY

Motorola Satellite Communications, Inc. urges the Commission to grant its request for a pioneer's preference and to deny the requests of the other applicants. Motorola is the only applicant which has met all of the criteria for obtaining a pioneer's preference.

There are numerous innovations associated with the IRIDIUM™ system which will result in new personal handheld communications services in the RDSS bands. Motorola is the innovator of such concepts as bidirectional operations, switches in the sky, onboard micro-processing and intersatellite links. It also is the only applicant that has demonstrated through field tests and otherwise that its proposed system is technologically feasible. No other applicant has even conducted propagation experiments.

The Commission should grant Motorola a nationwide preference in light of the universal nature of its service offerings. Such a preference would not create a monopoly. Over two-thirds of the RDSS bands would be available for other systems to operate in.

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COMMENTS

Motorola Satellite Communications, Inc. ("Motorola")
hereby submits its consolidated comments to the above-captioned
requests for pioneer's preferences.^{1/} Motorola urges the

^{1/} By Public Notice, Mimeo No. 22153 (Mar. 9, 1992), the Chief Engineer accepted for comment and consolidated the requests for pioneer's preference filed by Motorola, Constellation Communications, Inc. ("Constellation"), TRW, Inc. ("TRW"), Loral Qualcomm Satellite Services, Inc. ("LQSS"), and Ellipsat Corporation ("Ellipsat") establishing April 8, 1992, as the date for filing comments by interested parties. In an Order Denying an Extension of Time for Comments and Replies, DA 92-326 (Mar. 27, 1992), the Office of Engineering and Technology denied a
(continued...)

Commission to grant promptly its request for a pioneer's preference associated with its innovative IRIDIUM™ satellite system, and to deny the requests of all of the other parties to this proceeding. Only Motorola has developed and is providing the technology that will provide ubiquitous personal handheld communications services that are worthy of a pioneer's preference.

I. INTRODUCTION

Motorola is one of six applicants proposing to provide mobile and/or radiodetermination satellite services in the RDSS bands. It filed its application with the Commission to construct, launch and operate the IRIDIUM™ system on December 3, 1990.^{2/} The IRIDIUM™ system is a revolutionary concept in personal mobile communications, combining numerous technological innovations to form a worldwide low-Earth orbit ("LEO") satellite system which will provide a vast array of MSS and RDSS services to every point on the Earth. At the time Motorola filed its application, there was one other LEO application on file for a

^{1/} (...continued)
request by LQSS to extend for a period of one month the time for filing comments in this proceeding. The Chief Engineer has also issued a Public Notice, Mimeo No. 22205 (Mar. 11, 1992), announcing April 10, 1992, as the final day for the filing of additional pioneer's preference requests related to this docket.

^{2/} See Application of Motorola Satellite Communications, Inc. for IRIDIUM -- A Low Earth Orbit Mobile Satellite System, File Nos. 9-DSS-P-91(87) & CSS-91-010 (Dec. 3, 1990).

proposed system in the RDSS bands -- Ellipsat's ELLIPSO I system.^{3/} In response to the Public Notice accepting Motorola's and Ellipsat's applications for filing,^{4/} four other applicants -- Constellation, TRW, LQSS and AMSC -- subsequently applied for authority to construct satellite systems operating in one or both of the RDSS bands. Of the six pending applications, five propose to use LEO satellites and to provide RDSS service. AMSC proposes to operate a geostationary satellite system in the RDSS uplink band exclusively for non-RDSS services in a manner incompatible with the provision of RDSS by any other satellite system.

All of the LEO satellite applicants have requested a pioneer's preference for their asserted innovations and advancement of technological developments in the RDSS bands. Each of these applicants also has submitted petitions for rulemaking with the Commission requesting various changes in the regulations affecting the RDSS bands.^{5/} In addition, Celsat, Inc. ("Celsat") has recently requested a pioneer's preference and submitted a petition for rulemaking for a "hybrid personal communications network."^{6/} At least one of the spectrum

^{3/} There also were several LEO satellite applications proposing much smaller systems and distinctly different services below 1 GHz.

^{4/} See Public Notice, Report No. DS-1068 (April 1, 1991).

^{5/} See ET Docket No. 92-28. AMSC filed a petition for rulemaking requesting major changes in the frequency allocations for the RDSS uplink band, including the elimination of RDSS from the domestic allocation tables. See Petition of AMSC, RM No. 7806 (June 3, 1991).

^{6/} See Petition for Rulemaking, RM No. 7927 (Feb. 6, 1992); Request for Pioneer's Preference, File No. PP-28 (Feb. 6, 1992).
(continued...)

proposals identified by Celsat for its proposed network includes the RDSS bands.^{1/}

Without question, Motorola's IRIDIUM™ system is the only one of the LEO satellite systems which is entitled to a pioneer's preference under the Commission's standards as set forth in its rules and decisions. Motorola's IRIDIUM™ system truly is an innovative proposal which will lead to the establishment of services -- such as handheld portable mobile communications with worldwide interconnectivity -- not currently provided in the RDSS bands or elsewhere. Moreover, the IRIDIUM™ system will substantially enhance existing services by, for example, offering universal worldwide connectivity of RDSS, satellite paging and data services. Motorola's system design will bring to rural America and to the developing world countries, for the first time, the benefits of modern mobile communications on a cost-effective basis. The IRIDIUM™ system is a truly global communications system which will be able to provide universal service to all points on the Earth.

In addition, no other system has been as thoroughly tested and designed as the IRIDIUM™ system. Motorola has had the

^{6/} (...continued)

To Motorola's knowledge, Celsat has not submitted an application for its proposed geostationary system.

^{1/} Alternatively, Celsat proposes to utilize 37 MHz of spectrum in the S-band between 2.1 and 2.4 GHz. Celsat also has requested that the June 3, 1991 RDSS cut-off window for new applications be reopened so as to allow it to proceed with an application in those bands. Celsat's request is procedurally defective, coming over eight months after the RDSS window closed, and otherwise is not in the public interest. Motorola has separately filed today an Opposition to Celsat's rulemaking petition.

IRIDIUM™ concept under development for over four years -- at least two years prior to the filing of its system application with the Commission. Motorola also is in the process of conducting extensive propagation experiments and simulations in order to demonstrate the technical feasibility of all components of the IRIDIUM™ system.^{8/}

The IRIDIUM™ system design is extremely spectrum efficient, with its cellular architecture and multiple spot beams providing over 200 times frequency reuse worldwide, and its bidirectional operations in the RDSS uplink band resulting in an unsurpassed channel capacity per MHz of service band. In fact, Motorola's FDMA/TDMA modulation techniques will allow for as many as 4,400 simultaneous channels over CONUS in just 10.5 MHz of RDSS uplink spectrum. None of the other proposed LEO satellite systems can offer such spectrum efficiency.

There can be no doubt, moreover, that Motorola has been the real pioneer and innovator with respect to promoting LEO technologies and services for the provision of handheld portable voice communications, and in particular, the advances evidenced in its IRIDIUM™ system design. Motorola began developing the IRIDIUM™ system concept in 1987. Since that time, it has spent over \$50 million in research and development activities on the IRIDIUM™ system. Some of the results of these pioneering efforts are demonstrated in several issued U.S. and international patents as well as pending patent applications for such objects as the

^{8/} Preliminary results of these experiments and simulations will be provided to the Commission very shortly.

global LEO multiple satellite cellular communications system, its power management systems, its telemetry, tracking and control devices, its cell-to-cell hand-off strategies, and its position-aided portable communications subscriber units.

Awarding Motorola a pioneer's preference for its proposed LEO system would not be tantamount to authorizing it a nationwide monopoly for MSS and RDSS in the United States. As Motorola has previously pointed out to the Commission, its use of only 10.5 MHz of service spectrum still would leave over two-thirds of the RDSS bands for other qualified applicants to operate their proposed systems. More spectrum also may be available for such systems as a result of the decisions reached at the recently-completed World Administrative Radio Conference ("WARC-92"). In addition, the United States already has a domestic MSS licensee in the upper L-band authorized to operate in 28 MHz of service spectrum, and the Commission soon should be authorizing LEO systems below 1 GHz to provide radiodetermination and other satellite data services. Thus, Motorola would not be providing either RDSS or MSS on a monopoly basis if the Commission were to grant it a nationwide pioneer's preference for use of only one-third of the RDSS service bands.

II. STANDARD FOR REVIEWING PIONEER'S PREFERENCE REQUESTS

The Commission's newly adopted rules set forth the general standard for reviewing pioneer preference requests. In pertinent part, Section 1.402(a) states:

When filing a petition for rule making pursuant to Section 1.401 of this Part that seeks an allocation of spectrum for a new service or that, by use of innovative technology, will substantially enhance an existing service, the petitioner may also submit a separate request that it be awarded a pioneer's preference in the licensing process for the service. . . . In determining in its discretion whether to grant a pioneer's preference, the Commission will consider whether the applicant has demonstrated that it (or its predecessor-in-interest) has developed an innovative proposal that leads to the establishment of a service not currently provided or a substantial enhancement of an existing service.

Memorandum Opinion and Order in GEN Docket No. 90-217, 57 Fed. Reg. 7879 (Mar. 5, 1992).

This standard was meant to be "as specific as possible . . . without being so inflexible as to undermine its purpose of fostering new spectrum-based technologies and services." Id. at ¶ 7. To encourage parties to present innovative proposals to the Commission, the pioneer's preference rules provide for preferential treatment in the licensing processes "by reducing for innovators the delays and risks associated with the Commission's allocation and licensing processes." Report and Order in GEN Docket No. 90-217, 6 FCC Rcd. 3488 (1991). The Commission meant such pioneer's preferences to be "a significant reward . . . to induce innovators to present their proposals . . . in a timely manner." Id. at 3490. It, in effect, would "guarantee the innovating party a license in the new service . . . by permitting the recipient of a pioneer's preference to file a license application without being subject to competing applications." Id. at 3492.

The Commission also indicated that it did not intend to routinely grant such preferences; they would be given only "for

innovations of some significance." See Report and Order, 6 FCC Rcd. at 3500 n.8; Memorandum Opinion and Order, at ¶ 3. Examples of qualifying innovations include substantial changes from that which previously existed regarding an added functionality provided to a broader group of customers, a use of the spectrum different than previously available, or a change in the operating or technical characteristics of a service. Report and Order, 6 FCC Rcd. at 3494. The Commission further stated that it would give careful consideration to technologies that yield efficiencies in spectrum use, speed or quality of information transfer, spectrum sharing, or which significantly reduce costs to the public. Id.

The party requesting a preference also must demonstrate that it "has brought out the capabilities or possibilities of the technology or service or has brought them to a more advanced or effective state." Id. The Commission warned parties who might be filing "copycat" applications in an attempt to gain a preference, that it would look at each application very carefully to ensure that the applicant has pioneered the suggested innovations. Id. at 3495. On the other hand, the Commission stated that it would not necessarily accord the first filer a preference if that party did not make a significant investment of effort in developing the innovation under consideration. Id. at 3500 n.10.

Moreover, pursuant to Section 1.402(a) of the Rules, a pioneer's preference request must be accompanied either by a demonstration of technical feasibility of the new service or

technology, or an experimental license application. The Commission indicated that in most cases, it expected that the performance of experiments would be needed in order for it to have sufficient information regarding a new service or technology to award a preference. Id. at 3493. Such experimentation was also viewed as providing further evidence that a party had expended significant resources and capital in the development of its proposed innovations. Id. In order to receive credit for an experiment, an applicant must at least have commenced its experiment and reported its preliminary results to the Commission. Memorandum Opinion and Order, at ¶ 11.

Where little or no field testing of a new technology would be required to demonstrate its feasibility or where the marketability of a new service is apparent, experiments may not be a prerequisite to obtaining a preference. In such cases, the applicant is still required to demonstrate the technical feasibility of its new service or technology by other means. Report and Order, 6 FCC Rcd. at 3496. The Commission further indicated that it would be reviewing such technical showings rigorously to ensure that a proposed new service or technology is viable and worthy of a preference. Memorandum Opinion and Order, at ¶ 10.

To date, the Commission has had only limited experience with its new pioneer's preference rules. Motorola is aware of only one reported decision in which the Commission has interpreted and applied these rules. In that case, the Commission tentatively concluded that, of the three LEO

proponents requesting a preference for systems below 1 GHz, only Volunteers in Technical Assistance ("VITA") should receive a nationwide preference. See Tentative Decision in ET Docket No. 91-280, FCC 92-21 (Feb. 11, 1992). The Commission explained that VITA was entitled to such a preference because it "was the first to develop and demonstrate the utility of a small LEO system using VHF frequencies for civilian communications purposes." Id. at ¶ 1.

In making this initial determination, the Commission first decided:

- (1) whether the applicant has demonstrated that its proposal is technologically innovative; and
- (2) whether the innovation reasonably will lead to establishment of a service not currently provided or will substantially enhance an existing service.

It then evaluated the extent to which any experiments conducted by the applicants or other detailed technical submissions demonstrated the viability of the proposed innovations. Id. at ¶ 14.

VITA was granted a tentative preference because it was perceived to be the first to develop LEO data communications technology and to experiment with the operation of an actual LEO system to support data communications in the VHF spectrum. Id. at ¶ 15-16. Specific technological innovations associated with VITA's proposed system included direct terminal-to-terminal network operations between ground stations without any hubs or gateways. Id. The Commission also credited VITA with early research and development activities on its communications program. Id. VITA thus was viewed as the pioneer of LEO

satellites for civilian data communications at VHF frequencies. Id. The other two applicants were denied preferences because of their failure to demonstrate any innovations "beyond existing communications technology." Id. at ¶ 17-18. Many of the asserted technical achievements of these applicants were viewed as "relatively routine design features that most new LEO satellite licensees would be expected to accomplish."^{9/} Id.

III. THE COMMISSION MUST ACT PROMPTLY AND
GRANT A PREFERENCE IN THIS PROCEEDING

The current proceedings involving the RDSS bands present a perfect example of the need to cut through regulatory roadblocks in order to encourage innovation. There are six applicants requesting construction permits for satellite systems in all or part of these bands. The first applications were filed over sixteen months ago. AMSC's geostationary application is incompatible with all five of the LEO applications, and it appears that not all of these LEO applicants can operate in the limited frequency spectrum available.

Absent the award of a pioneer's preference for truly innovative proposals, the licensing of a LEO system above 1 GHz could be many months, if not years away. Such a delay would

^{9/} One of the applicants was not credited for asserted advances in launch technology because such developments were "not within the class of innovations in new communications systems and services" entitled to a pioneer's preference. Tentative Decision, at ¶ 17. The other applicant was not credited for its proposal to use spread spectrum technology in its satellite design. Id. at ¶ 18.

substantially jeopardize any U.S. program in light of recent announcements of other foreign-based international systems and the ongoing international coordination process.^{10/} The Commission simply cannot wait any longer to license Motorola's truly innovative satellite system. The applicants, as well as potential investors and partners around the world, must have some assurance that the Commission will license promptly those systems worthy of a pioneer's preference.

IV. ONLY MOTOROLA IS DESERVING OF A PIONEER'S PREFERENCE FOR ITS INNOVATIVE IRIDIUM™ SYSTEM

Of the six parties who have requested a pioneer's preference in this proceeding, only Motorola has presented the Commission with a truly innovative proposal for a global LEO digital voice communications system above 1 GHz. The other applicants either have copied Motorola's previously announced innovations or developed proposals which do not significantly advance the state of the art of personal satellite communications services or technologies. Motorola is also the only applicant that has demonstrated, through experiments or otherwise, the technical feasibility of its proposed technological and service innovations.

^{10/} Of particular note is the recent filing with the IFRB of INMARSAT's so-called Project 21 concept which includes operations in the RDSS bands. As the Commission is well aware, the IFRB recently Advanced Published the Untied States' HIBLEO registration materials. See IFRB Advanced Publication, Special Section No. AR11/A/794 (Feb. 4, 1992).

A. Motorola is the Only Applicant Eligible
for a Pioneer's Preference in this Proceeding

1. Motorola Pioneered the Development of
LEO Personal Voice Communications Systems

As is well known to the Commission, Motorola is a world leading innovator and supplier of products for terrestrially-based mobile communications, including cellular telephony. What is less well known to the Commission is that Motorola is a leading innovator and supplier of communications subsystems for satellite systems used by the U.S. government. Motorola has been involved in satellite-based communications for over 25 years and employs over one thousand professionals in its satellite communications division.

While terrestrially-based mobile personnel communications has grown tremendously during the past two decades, it became clear to Motorola that in some parts of the world the investment costs for the infrastructure needed to make terrestrial personal telecommunications services truly ubiquitous on a global basis would never be feasible. Likewise, satellites in geostationary orbit have not been able to provide either fixed or mobile voice telecommunications at cost levels appropriate for nations with low per capita income.^{11/} Despite the great

^{11/} Intelsat's Vista service, specifically designed for thin routes at "low" cost using GSO satellites, has had only very modest growth over the past ten years -- and much of that for missions in remote areas of developed nations. Inmarsat has made strides in attempting to transfer its GSO satellite experience with small earth terminals in the marine environment to similar terrestrial fixed and vehicular use, but these terminals and
(continued...)

strides in telecommunications technology and manufacturing of the past several decades in the fields of high capacity satellites and fiber optics, and the phenomenal advances in the use of low cost, digital semiconductor devices for telecommunications, when Motorola started its research and development activities on the IRIDIUM™ system over four years ago, the world did not seem any closer to finding the solution to providing communications capabilities in remote areas of the world on a cost-effective basis.

Motorola's initial system design studies in 1987 and 1988 recognized GSO satellites might one day be developed to help fill these coverage gaps. However, the state-of-the-art of very large unfurlable satellite antennas that would be required for this mission led to the conclusion that requisite development effort would be extremely expensive and the desired service would not be possible until well into the next century. Thus, consideration was shifted to system concepts employing the long-ignored LEO satellites. By the Summer of 1988, Motorola had developed a conceptual design of the IRIDIUM™ system and began briefing potential satellite manufacturers and launch vehicle suppliers. Approximately one year later, Motorola began a program of private presentations to potential customers and investors, including Telesat, Inc./TMI and INMARSAT. Several

11/ (...continued)

projected Inmarsat space segment costs are not appropriate for nations with low per-capita income.

Commissioners were also briefed in early 1990 on Motorola's LEO satellite efforts.

The IRIDIUM™ system design has resulted in a revival in consideration of LEO satellites for real-time voice and other telecommunications. Motorola has taken an old, discarded concept -- LEO satellites -- and surrounded that concept with many highly advanced subsystems, and thereby created a new, innovative personal communications system. To convince oneself of the innovative nature of Motorola's contribution, one need only compare the number of trade press and technical journals referencing LEO satellites for real-time voice communications before and after the formal public announcement of the IRIDIUM™ system on June 26, 1990.^{12/} Motorola released its first paper to the public approximately one month later in Adelaide, Australia. Since that time, a number of companies and the world telecommunications community at WARC-92 have shown their intense interest in providing RDSS and voice services using LEO technologies.

2. There Are Numerous Technological Innovations Associated with the IRIDIUM™ System Which Motorola Has Developed

^{12/} On June 26-27, 1990, Motorola formally announced the IRIDIUM™ system concept in New York, London, Beijing and Melbourne. The Commission staff was also briefed at that time on the parameters of the system.

Motorola has also developed numerous technological and service innovations in designing its IRIDIUM™ system, including the following:

- (1) The ability to provide personal mobile communications to anyone, anywhere, anytime using earth terminals that are small, lightweight, pocket-sized, battery-operated, and have low-profile antennas;
- (2) The coverage of the Earth with cells coupled with beam hopping/TDMA which provides for a high degree of frequency reuse;
- (3) Distributed processing systems in the sky using intersatellite links. Each IRIDIUM™ satellite demodulates the signals, converts them to baseband, employs onboard processing, and routes efficiently;
- (4) Soft, troublefree cell and satellite-to-satellite handoffs, and the method for predicting such handoffs;
- (5) Bidirectional operation in the service bands;
- (6) Multiple beam deployable space antenna systems;
- (7) A power management system whereby overlapping cells are turned off as satellites approach the polar regions; and
- (8) Devices for narrow band Doppler compensation which conserve power and can be used with handheld communications units.

Many of these innovations are the subject of issued and pending patent applications, both domestic and international.

3. IRIDIUM™ System Innovations Will Lead to New Global Personal Voice Communications Services and Universal Service

The technological innovations encompassed in the IRIDIUM™ system will enable, for the first time, persons anywhere

in the world to communicate with one another using portable handsets. Such communications will include digital voice, data, paging and RDSS, and provide for interconnection to the public switched telephone network.

Motorola's personal communications concept is substantially different from those LEO satellite systems proposed in the VHF/UHF bands. The latter are primarily directed at providing store and forward data communications services over a relatively small bandwidth. The IRIDIUM™ system, on the other hand, will be capable of providing worldwide voice communications on a real time basis to tens of thousands of users simultaneously. Seventy-seven satellites in seven polar orbits also will ensure universal service to any point of the Earth.

4. None of the Other Applicants Have Proposed Any Technological or Service Innovations

None of the other applicants requesting a pioneer's preference has proposed a satellite system which would further significantly the state of LEO satellite technology, or offer services not currently available or previously proposed by Motorola. Indeed, none of these applicants will be able to provide truly ubiquitous global personal communications services such as those to be offered over the IRIDIUM™ system.^{13/}

^{13/} See Motorola's Petitions to Dismiss and/or Deny (Dec. 18, 1991).

a. Ellipsat's ELLIPSO Systems

Ellipsat claims to be an innovator because it was the first to file in the RDSS bands for expanded communications services and because its proposed system represents the first commercial use of elliptical orbits.^{14/} Ellipsat concedes, however, that its system design "uses existing state-of-the-art technology."^{15/} Without any support, it goes on to claim credit for being the first company to recognize that LEO technology could be used to provide mobile voice and position location services. Among the asserted innovative features of its system design are the use of CDMA/spread spectrum modulation techniques, transparent interconnection between terrestrial cellular and satellite communications, and high-quality, low-cost RDSS and mobile voice services.^{16/} In fact, none of these purported innovations were developed by Ellipsat.

The fact that Ellipsat filed its ELLIPSO I application the month before Motorola submitted its IRIDIUM™ system application is irrelevant to an analysis of Ellipsat's pioneer preference request. As the Commission has already observed, its focus is on the developer of an innovation, and not the applicant who might have been the first to file its request. See Report and Order, 6 FCC Rcd. at 3500 n.10. Indeed, in the "small" LEO

^{14/} See Request for Pioneer's Preference of Ellipsat, File No. PP-30, at 2 (July 29, 1991).

^{15/} Id.

^{16/} Id.

proceeding, the Commission has preliminarily awarded a preference to VITA who was not the first entity to file a "little" LEO application.

As previously indicated, Motorola publicly announced its IRIDIUM™ system concept in June 1990, almost five months before Ellipsat filed its first LEO application. Included within that announcement was Motorola's intention to operate its system in the L-band in conjunction with terrestrial cellular systems. Thus, it simply is misleading for Ellipsat to claim credit for pioneering the expanded use of the RDSS bands. Nor can Ellipsat legitimately claim credit for any technological innovations associated with the use of elliptical orbits. Such orbits have been utilized by a number of LEO satellites, including the Molniya system which provided domestic television and telephone service for the USSR from a highly elliptical orbit for many years.

CDMA spread spectrum technology also is nothing new to satellite communications systems. Indeed, the current RDSS rules, which were adopted in 1985, envision such modulation techniques for dedicated RDSS systems. In denying a preference request to one of the "small" LEO applicants, the Commission rejected as not being sufficiently innovative, a similar invocation of spread spectrum technology.^{17/} In any event, none of the LEO applicants has yet been able to demonstrate the technical feasibility of CDMA/spread spectrum techniques for accommodating multiple non-homogeneous continuous wave satellite

^{17/} See Tentative Decision, at ¶ 18.

systems. Motorola is aware of no technical evidence to support the claims that sufficient interference control can be maintained to meet stated capacity numbers.

b. TRW's Odyssey System

TRW claims that it too will offer an innovative communications satellite system by introducing spread spectrum mobile voice and data services into the RDSS bands to provide so-called Mobile-Enhanced RDSS to handheld transceivers. It further notes that spectrum efficiency will be achieved through a multi-cell beam configuration. No other technological innovations are identified in TRW's pioneer's preference request.^{18/}

For the same reasons identified above for rejecting the CDMA/spread spectrum "innovations" of the Ellipsat systems, no credit should be given to TRW for its belated request for a similar pioneer's preference. Moreover, TRW's claimed innovation of combining MSS and RDSS services in one band is merely a reformulation of Motorola's service concepts as announced almost one year prior to the filing of TRW's application. TRW's multiple cell beam concept also mirrors the IRIDIUM™ system's cellular spot beam design. Thus, TRW has failed to demonstrate any innovations beyond existing communications technology.^{19/}

^{18/} See Request for Pioneer's Preference of TRW, File No. PP-33 (Sept. 6, 1991).

^{19/} See Tentative Decision, at ¶ 17-18.

c. LQSS' Globalstar System Designs

The claimed technological innovations and new services promoted by LQSS, for the most part, appear to be derived from other LEO applications, including Motorola's IRIDIUM™ system application.^{20/} Thus, its "new and enhanced" RDSS and mobile voice and data services to handheld and other mobile or portable units were promoted by Motorola in its first public announcements of the IRIDIUM™ system some one year before the filing of LQSS' application. Nor can LQSS claim any credit for bidirectional operations in the RDSS uplink band. Once again, Motorola was the first applicant to publish this capability in a LEO system. LQSS' remaining claims of system architecture and system design innovations -- such as call setup mechanisms, user validation, call handoffs, and spot beams -- simply are not unique to its proposed system, and in any event, must be viewed as relatively routine design features that most new LEO licensees must accomplish.^{21/} Similarly, its proposed CDMA/spread spectrum modulation approach does not rise to the level of a technological innovation beyond existing communications technology.^{22/}

LQSS also identifies its proposed antennas as innovative. These antennas have "shaped" beams with gain patterns arranged to compensate for path and atmospheric loss

^{20/} See Request for Pioneer's Preference of LQSS, File No. PP-31 (Nov. 4, 1991).

^{21/} See Tentative Decision, at ¶ 17-18.

^{22/} Id.